# **Angular Momentum**

## How Can a Diver Spin Faster?

By Woody Franklin, About.com Guide

Angular momentum, and the conservation of angular momentum, are physical principles that describe why a body – in our case that of a diver, can seemingly speed up its rotation without force being applied.

In an effect that may seem like magic; divers can spin and twist faster or slower as a result of the slightest movement, one that often times goes unnoticed by those watching.

#### What Is Angular Momentum?

First, let's answer the question. What is angular momentum?

Angular momentum can be described as the rotation of a body about a particular axis as a result of its speed of rotation and the distribution of mass about that axis!

Really?

Ok, let's attempt to put that in simpler terms. For our purposes here we are dealing with the speed (the angular momentum) at which a diver will spin or twist, as long as nothing changes. In technical terms that means that there is no external torque that effects the body, such as a <u>shammy</u> thrown by an adoring teammate!

Now obviously things do change during a dive, but if they didn't (and there were no such thing as gravity or friction), a diver could spin or twist in the same position forever (or at least until they got sick), if it was not effected by an outside source (torque).

The ability of a diver to do this is based in the principle known as the Conservation of Angular Momentum.

Now things do affect a diver and their spin or twist, so what happens then?

### **Faster and Slower**

As long as there are no external torque(s) (such as shammy, <u>spotting belt</u> or <u>diving board</u>) that impact the diver, the conservation of angular momentum allows that diver to continue to spin and twist with the only variable that comes into play being a "moment of inertia."

Oh no, not another technical term!

But this one is easy, because the moment of inertia describes how big or small you are in your  $\underline{tuck}$ , <u>pike</u> or twist.

If you change the size of your tuck by squeezing it tighter, your moment of inertia is less and you spin faster due to ... are you ready - the conservation of angular momentum!

This is the reason that a diver who <u>splits their tuck</u> can spin faster - the diver who splits reduces their size (radius) around the point (axis) on which they are spinning.

Although things like gravity and friction do come into play, the conservation of angular momentum and moment of inertia are important aspects, especially as dives become more and more difficult and divers look to find ways of spinning and twisting faster.

#### Why Is Important to Diving

This may be restating the obvious, but understanding angular momentum, the conservation of angular momentum, torque, and the moment of inertia can help every diver become better. The more a diver understands what they are doing, the easier it is for that same diver to make changes; and as a result become better.

It also helps for coaches and parents to understand that there is a bit of science behind many a coaches pleadings and exhortations.

So the next time a coach "advises" a diver to squeeze their tuck or pike it is not necessarily because it looks nice – although that is certainly true. They tell a diver to squeeze because it will make them spin faster due to a reduced moment of inertia and the conservation of angular momentum. And this is what helps them finish a front 3 1/2 four feet above the water instead of two!